

## REMARKS

Claims 1, 3, 9, 14, 61 and 67, 68, 70 and 71 are pending in the present application. Claims 59, 60, and 63 through 66 remain withdrawn in the present application as being drawn to a non-elected species. Claim 71 has been added to specify the preferred length of the heat transfer conduits as set out at page 17, lines 5 and 6.

In the Office Action, claims 1, 3, 9, 14 and 67 – 70 were rejected under 35 U.S.C. § 103 (a), as being unpatentable over the combined teachings of Houdry, Kaestner, and Loo. Claim 61 was rejected over the above references in addition to Ashe GB 2374948. Claim 69 has been canceled and, as such, the rejection thereto is moot and should be withdrawn.

Independent claim 1 has been amended in order to more clearly recite that which is the invention. In particular, claim 1 has been amended, *inter alia*, to recite that:

- a heat exchanger to variably control the temperature of a process fluid
- a reaction vessel comprising a heat transfer surface about its exterior, wherein said heat transfer surface is in contact with said process fluid disposed within said reaction vessel
- a plurality of circumferential heat transfer conduits which allow for the independent control of heat transfer fluid supplied to each said heat transfer conduit, wherein said heat transfer conduits are disposed about and in contact with said heat transfer surface of said reaction vessel, whereby the transfer of heat between said process fluid and said heat transfer fluid occurs across said heat transfer surface
- wherein each of said plurality of heat transfer conduits has a length of at most twice the circumference of said vessel

- wherein each of the 10 to 200 heat transfer conduits extends around the circumference of the reaction vessel and wherein each conduit has a cross sectional area for the flow path of less than 2,000 square millimetres.

Thus, claim 1 particularly points out and defines that which Applicants claim as their invention. That is, the heat transfer conduits are disposed about a reactor vessel and such that the amount of heat transfer fluid supplied to each conduit can be independently controlled, thus allowing the novel and unique control of the temperature of the process fluid by controlling the amount of heat transfer fluid that passes through each of the conduits and providing for a unique reduced volume heat exchanger.

To the contrary, Houdry comprises a stack of separate reactors each of which is provided with a single cooling coil (7) that passes six times around the reactor. Each reactor is separately fed with reactants at the top of the reactor (through conduits 17a) and reaction products are taken off at the bottom of each reactor (through conduits 18a). Houdry does not therefore disclose a single reactor vessel provided with a plurality of separately fed circumferential heat transfer elements. (See Elements 15 and 16). Furthermore, it does not disclose that the elements have a length of at most twice the circumference of the vessel. Houdry's single cooling coil would, in fact, teach away from that which is recited in claim 1, as amended herein.

Similarly, Kaestner shows in Figures 1 and 4 that each coil has five convolutions of the coil around the vessel and Loo has a minimum of three coils fed from the same source of coolant.

Accordingly, none of the references result in a system in which each conduit extends around the circumference of the vessel, that each of the conduits be controlled independently from the others, nor has a length of at most twice the circumference of the vessel as recited in claim 1, as amended

herein.

Accordingly, no combination of these references will arrive at the features recited in claims 1, 3, 9, 14, 67, 68, 70 and 71.

By the use of the coils that are independently fed and which have a length at most twice the circumference of the vessel the volume of heat transfer fluid required for accomplishing the required degree of temperature control can be significantly reduced and, the accuracy of the temperature control is enhanced.

In the attached Declaration, photographs of the reaction system of the present invention are provided. The Declaration shows a reaction system having and one with a half coil. The photograph of the system of the invention shows feed to alternate conduits, the feed to the other conduits cannot be seen as it is from behind the reactor. For a 400 litre batch reactor, the reactor of the invention requires about 8.5 litres of coolant for good temperature control whereas the half coil reactor requires about 49 litres. Furthermore, the response time to a change in temperature of the reactor contents can be less than 2 seconds as opposed to  $\frac{1}{2}$  up to 1 minute with the half coil reactor.

This is not the advantage acknowledged by Kaestner. Kaestner simply feeds coolant from a single source simultaneously in different locations along the length of the vessel to obtain more uniform cooling than would be achieved if the fluid was introduced only at the bottom of the vessel. There is no recognition in Kaestner that benefits may be achieved by reducing the volume of heat transfer fluid employed by virtue of using separately fed, short heat transfer conduits, as required by claim 1, as amended herein.

Accordingly, Applicants respectfully submit that claims 1, 3, 9, 14, 67, 68, 70 and 71 are non-obvious in view of the combination of Houdry, Kaestner, and Loo. In addition, the addition of Ashe GB 2374948 does not overcome the

substantial deficiencies mentioned above regarding Houdry, Kaestner, and Loo, and, thus, does not make obvious that which is recited in claim 61.

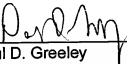
Reconsideration and withdrawal of the 35 U.S.C. § 103(a) rejections are respectfully requested.

In view of the above, it is respectfully requested that the present application is in condition for allowance. Favorable consideration of the present application is respectfully requested.

Consideration and allowance of application is respectfully requested.

Respectfully submitted,

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Date

  
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Paul D. Greeley  
Attorney for Applicant(s)  
Registration No. 31,019  
Ohlandt, Greeley, Ruggiero & Perle, L.L.P.  
One Landmark Square, 10<sup>th</sup> Floor  
Stamford, CT 06901-2682  
(203) 327-4500